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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,349	01/05/2004	Kirkland D. Broach	ARF 2004-003	2219

7590 03/02/2005

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EXAMINER

GREENE, DANIEL LAWSON

ART UNIT PAPER NUMBER

3641

DATE MAILED: 03/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/751,349

Applicant(s)

BROACH ET AL.

Examiner

Daniel L. Greene Jr.

Art Unit

3641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Amendment to the abstract and claim 17 is acknowledged and the objections of sections 2 and 3 of the 9/23/2004 Office action are withdrawn.
2. Applicant's arguments filed 12/8/2004 have been fully considered but they are not persuasive as discussed more fully below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1, 2, and 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger in view of either the Mechanical Engineering Handbook, CRC Press LLC, ©1999 or the Industrial Burners Handbook, CRC Press LLC ©2003 or the Mechanical Engineering Handbook, SIXTH EDITION, MCGRAW-HILL BOOK COMPANY, INC, ©1958.**

Shallenberger clearly discloses claim 1, a fuel assembly (10) for a nuclear reactor including a plurality of elongated nuclear fuel rods (22) having an extended axial length, at least a lowermost grid (20) supporting said fuel rods (22) in an organized array and having unoccupied spaces (52) defined therein adapted to allow flow of fluid

coolant there through and past said fuel rods (22) when said fuel assembly (10) is installed in the nuclear reactor and a plurality of guide thimbles (18) extending along said fuel rods (22) through and supporting said grid (20), a debris filter bottom nozzle (12) disposed below said grid (20), below lower ends of said fuel rods (22), supporting said guide thimbles (18) and adapted to allow flow of fluid coolant into said fuel assembly (10), said debris filter bottom nozzle (12) comprising a substantially horizontal plate (46) extending substantially transverse to the axis of the fuel rods (22) and having an upper face directed toward said lowermost grid (20), said upper face of said plate (46) having defined there through at least two different types of holes, the first type being a plurality of holes (66) receiving lower ends of said guide thimbles (18) where they are supported by said plate (46) and the second type being a plurality of flow through holes (48) extending completely through said plate (46) for the passage of coolant fluid from a lower face of said plate to the upper face of said plate, each of said coolant flow through holes (48) extending substantially in the axial direction of said fuel rods (22), in fluid communication with said unoccupied spaces (52), and in the extended direction at least some of said coolant flow through holes (48) having a profile substantially of a venturi, in Figures 1-10 and column 3 lines 24-54 and 67+, and columns 4-6, however Shallenberger does not disclose that the flow through holes (48) include a flaring at both ends.

Fluid Mechanics in Chapter 3 of the Mechanical Engineer's Handbook, CRC Press LLC ©1999 teaches on page 3-190 that a conical diffuser section downstream from the throat of a venturi gives excellent pressure recovery.

Chapter 3 Fluid Flow of the Industrial Burners Handbook, CRC Press LLC ©2003 also teaches in Figure 3.3 and section 3.3.3 that a conical diffuser section downstream of the throat of a venturi provides a transition to the downstream section and that typically this section is designed with small transition angles to provide smooth flow in order to reduce pressure losses.

Chapter 3 pages 59-65 of the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 teach the advantages of orifice geometry concerning fluid flow coefficients, divergence, friction, etc., through various orifices including venturis.

These references are analogous art because they are directed towards fluid flow through an orifice, which is directly pertinent to applicant's particular problem and current concern.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to provide flaring at both ends of the flow through holes, because of the advantages of increased flow, reduced pressure losses, smoother downstream flow, etc., as such results are no more than basic mechanical principles of fluid flow dynamics available within the art.

Claim 7 is clearly disclosed in Shallenberger, column 8 lines 2-26.

Claim 8 is clearly disclosed in Shallenberger, Fig 1 and column 5 lines 1-6

Claim 9 is clearly disclosed in Shallenberger, Figures 3 and 6.

Claims 10 and 11 are clearly disclosed in Shallenberger, column 8 lines 2-5.

Claim 12 is clearly disclosed in the rejection of corresponding parts above.

5. In response to applicant's argument that the Mechanical Engineer's Handbook, CRC Press LLC ©1999, Chapter 3 Fluid Flow of the Industrial Burners Handbook, CRC Press LLC ©2003, and the Mechanical Engineering Handbook, SIXTH EDITION, MCGRAW-HILL BOOK COMPANY, INC, ©1958 is **nonanalogous art**, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, these references are pertinent to fluid flow through orifices, the specific geometries of and uses for venturi's, including industrial applications, etc. Chapter 3, pages 59-65 of the Mechanical Engineering Handbook is specifically directed towards fluid flow through an orifice, which is directly pertinent to applicant's particular problem and current concern, regardless of industrial application.

6. In response to applicant's argument that none of the references suggest applying a venturi to a bottom nozzle of a pressurized water reactor, a **recitation of the intended use** of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963).

7. In response to applicant's argument that there is **no suggestion to combine** the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, one of ordinary skill in the art is generally knowledgeable about fluid flow dynamics due to the nature of nuclear reactors and the catastrophic consequences of improper fluid flow within such. Additionally, the references provide motivation within themselves as explained in sections 5 and 6 of the 9/23/2004 Office action.

8. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper **hindsight** reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

9. **Claims 3, 4, 6 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger as modified by either the Mechanical Engineering Handbook, CRC Press LLC, ©1999 or the Industrial Burners**

Handbook, CRC Press LLC ©2003 or the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 as applied to claims 1, 2 and 7-12 above and further in view of further teachings of the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958.

With regard to claims 3, 4, and 13-16, Shallenberger discloses Applicant's invention as modified above, however Shallenberger as modified above does not disclose that the flow through holes (48) include a double angle chamfer on the inlet end.

Chapter 3 pages 59-65 of the Mechanical Engineering Handbook, SIXTH EDITION, McGRAW-HILL BOOK COMPANY, INC, ©1958 further teach fluid flow through venturi's and orifices and that beveling the sharp upstream edge, even slightly, increases the discharge of an orifice. (see page 3-64 Rounding) Rounding the inlet edge of an orifice can obviously take many forms (Fig. 6), from multiple angle bevels, to rounding. In the case of a rounded edge, it is understood that the inlet angle would be comprised of an infinite number of chamfer angles, including those proposed by applicant.

As stated before, this reference is analogous art because it is teaching the principles of fluid flow through venturi's and orifices.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet of the flow holes by increasing the bevel with a double edge chamfer as well as a double angle chamfer

approximating a curved surface in order to increase the discharge of the orifice as such results are no more than optimization of the previous art as Applicant's disclosure states on page 2 lines 3 and page 8 lines 5-7 by using old and well known basic mechanical principles of fluid flow dynamics available within the art.

Claims 6 and 17 are disclosed in The Mechanical Engineer's Handbook SIXTH EDITION, MCGRAW-HILL BOOK COMPANY, INC, ©1958 section 3 pages 59 – 65, wherein it is apparent Applicant has translated/converted the table of claim 5 into mathematical equations stemming from typical venturi and orifice geometric relationships. As such, applicants table and values are no more than standard mechanical properties/geometric relationships available within the art.

See MPEP § 2144.05 II "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955) and *In re Hoeschelle* 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (underlining added)

10. **Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shallenberger as previously modified by either the Mechanical Engineering Handbook, CRC Press LLC, ©1999 or the Industrial Burners Handbook, CRC Press LLC ©2003 and the Mechanical Engineering Handbook, SIXTH EDITION, MCGRAW-HILL BOOK COMPANY, INC, ©1958 as applied to claims 1-4 above and**

further in view of further teachings of Chapter 42 Fluid Measurements of The Engineering Handbook, CRC Press LLC, ©2000

Shallenberger as modified above further discloses an inlet chamfer angle of 12 to 15 degrees in column 8, claim 3 lines 27-29, however Shallenberger as modified does not expressly disclose the chamfer angle of the outlet of the flow through hole.

As previously discussed, the "inlet chamfer A" falls within the range in the rejection of corresponding parts of section 9 above.

Figure 42.6 Venturi Tube teaches that the diffuser section (outlet chamfer C) of a venturi may have an angle range of 5-15 degrees.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the flow characteristics of the inlet and outlet of the flow holes because of the advantages of increased discharge flow rate, decreased pressure loss of the orifice, etc., as such results are no more than standard practices and well known basic mechanical principles of fluid flow dynamics available within the art.

See MPEP § 2131.03 II Anticipation of Ranges, MPEP § 2144.05 Obviousness of Ranges as well as MPEP § 2144.05 II "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955) and *In re Hoeschelle* 406 F.2d 1403, 160 USPQ 809 (CCPA 1969)

11. In response to applicants argument that MPEP § 2144.05 I and MPEP § 2144.05 II are only directed towards chemical ranges and not combinations of mechanical angles, it must be understood that these sections are not limited to only those specific cases and particular fields of endeavor, but are used as analogies for other arts and other cases. These cases are generalities showing that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." Underlining added)

12. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning and that the examiner is using applicant's claimed invention as an instruction manual or template to piece together the teachings of the prior art by trying to isolate ranges rather than considering the combination of ranges, which are claimed together. In and of itself, It would have been prima-facia obvious to one ordinarily skilled in the art to optimize Shallenberger by varying the angles of the inlet and outlet orifices, however the Examiner has provided documentary evidence that more than one reference has used part if not all of applicant's claimed range of desired coverage, and that those generally knowledgeable in the art are fully aware (and knowledgeable) of the ranges of angles proposed by applicant and, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

13. Examiner's Note: Examiner has cited particular columns and line numbers in the references for the convenience of the applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant, in preparing the responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Smith and Grattier also show debris filter bottom nozzle assemblies with flow through holes having chamfered inlets.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel L Greene Jr. whose telephone number is (703) 605-1210 until April 6th, 2005 at which time it will change to (571) 272-6876. The examiner can normally be reached Monday thru Friday 8:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael J Carone can be reached on (703) 306-4198. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

17. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DIG 
February 22, 2005


MICHAEL J. CARONE
SUPERVISORY PATENT EXAMINER